Clean Air Facts

Dust, Smoke, and Fumes -- Particulate Matter Emissions

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Air pollution that you can see and smell are the most obvious forms and can be found in dust, smoke and fumes. Wisconsin Department of Natural Resources (DNR) regulates these as Particulate Matter Emissions (PM) under chapter NR 415, Wis. Adm. Code. These requirements cover not only the emissions from processes inside an industrial building, but also those from outside activities. This summary will help you begin to understand your responsibilities to prevent particulate matter emissions.

Who is Affected By the Rule?

Anyone creating enough dust, smoke or fumes that are a noticeable source of air pollution must control those emissions. The following are examples of the types of activities that would create particulate matter emissions that must be prevented:

- ☛ Large trucks transporting your materials along a dirt road.
- ☛ Grinding, sanding, painting, welding, sandblasting activities, indoors or out.
- ☛ Piles of materials stored on site - like sand, gravel, coal, dirt, etc.
- ☛ Unpaved parking lots.
- ☛ Dry materials used in an industrial process that are not collected in some fashion - by baghouse, cyclone(s), wet scrubber, etc.

This is just a short list of the possible activities that create particulate matter emissions. Contact the Small Business Clean Air Assistance Program (SBCAAP) if you have any questions about whether you have a particulate matter emissions source.

What Are the Requirements?

Anyone who creates a particulate matter emission must do as much as possible to control those emissions from escaping into the environment.

- ☛ For **roads or storage piles** this may mean using water or chemicals to prevent dust plumes. Also, paved roads create minimal dust. Storage piles can be kept within a three-sided building to minimize emissions.
- ☛ If you have to **grind, sand, paint or weld** outside do it on a day with low wind and make sure residential areas are upwind of the activity. Indoors, there are methods available to capture the majority of the emissions from these activities.
- ☛ Mechanical collection devices like cyclones and dry filters are good, low cost ways to control particulate matter emissions from **indoor processes**. A baghouse can be a very high efficiency control option but it comes with a slightly higher cost than the others. A higher collection efficiency can often mean higher costs.

Emissions From a Process

Sometimes, because of the type and amount of dust created by a process a series of collection devices may be necessary to control the particulate matter emissions. Particulate matter emissions from a process are set at specific levels.

Certain types of processes have a specific level of emissions that is allowed, based on the amount of material that passes through the process. These “process weight rate”

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limits are different depending on the most recent date the process was constructed or modified. The specific limits are in the rule under s. NR 415.05, Wis. Adm. Code.

Processes constructed on or before April 1,1972 must meet the most restrictive of the two limits. The one type of limit is set based on pounds of particulate matter per 1,000 pounds of exhaust gas for specific types of processes. Depending on the process, the limits range from 0.01 to 0.04 pounds of particulate matter per 1000 pounds of exhaust gas. These limits are then also dependent on the maximum airflow coming from the process. The second limit is the same as those for processes constructed after April 1, 1972.

Processes constructed after April 1, 1972 must meet one of two equations:

- If your process throughput is up to 60,000 pounds per hour, then you have a limit of 3.59 x process weight in tons per hour (P), raised to the power of 0.62. That looks like: $E=3.59(P)^{0.62}$ where E is the allowed emission rate in pounds per hour.
- If your process throughput is more than 60,000 pounds per hour, the limit is 17.31 x process weight rate in tons per hour (P), raised to the power of 0.16 or $E=17.31(P)^{0.16}$.

These equations do require a scientific calculator to perform the calculations. Standard calculators will not have a y^x (or y raised to the power of x) button on them. For example, if your process weight rate is 2500 lb/hr of parts plus the paint applied:

P = 2500 lb/hr / 2000 lb/ton = 1.25 ton/hour
$E = 3.59 \times (1.25)^{0.62} = 3.59 \times 1.148 =$ **4.12 lb/hr**

In other words, your process is only allowed to emit 4.12 pounds of particulate matter emissions per hour.

If you have a fuel burning unit, whether it's a boiler or steam generator or heat treating furnace, etc., these have separate limits. These limits are based on construction date and the size of the unit in terms of million BTU per hour heat input rating of the unit. Refer to the rule in s. NR 415.06, Wis. Adm. Code, for the specific limits.

Requirements in a Permit

The value of your process specific particulate matter emissions limit and control methods, records or testing that you need to perform to show you meet those limits will all be included in an air permit. If you have outdoor particulate matter emissions, you may also have control methods and records that you will have to perform periodically.

If your maximum theoretical emissions (MTE) from a process are greater than the emission limit specified in the rule, then you may be required to install an add-on control device to the exhaust from that process. *For an explanation of MTE, refer to the* ***MTE and PTE Calculation Examples*** *Fact Sheet published by the Small Business Clean Air Assistance Program (SBCAAP).*

Another scenario is that modeling done during a permit review may show that even the emission limit from the rule does not meet the National Ambient Air Quality Standard (NAAQS) for particulate matter. You may have to reduce the emissions from the process sufficiently to meet the NAAQS and that may include installation of an add-on control device. *For an explanation of the modeling process, refer to the* ***Modeling Emissions for Permits*** *Fact Sheet also published by the SBCAAP.*

Control Device Options

If you cannot meet the limits on your process emissions, you will likely need to put a control device on the exhaust gas to capture the particulate matter. The following are brief descriptions of some control devices available for particulate matter collection.

Cyclones and Inertial Separators

Devices that knock particles out of an air stream by using inertia will generally collect the medium to large sized particles. Because they usually

have a simple construction and no moving parts, it means that capital and maintenance costs are lower than for other particle collection devices.

In cyclones, the particles are collected when the exhaust gas is forced to spin in a vortex through a tube. They can be used singly or in a multiple unit arrangement for larger air volumes.
Cyclones are utilized by industries like:

- ✓ chemical (dry form),
- ✓ coal handling,
- ✓ metal working,
- ✓ rock crushing,
- ✓ plastics,
- ✓ wood working,
- ✓ or anyone who does grinding, sanding, blending, machining, crushing or similar activities.

Wet Scrubbers

A more efficient device that still uses the principle of inertia is the wet scrubber. Other physical principles are also involved in a wet scrubber besides inertia. In general, the added weight of water to the particle allows it to be collected.

Wet scrubbers are often found in processes with:

- ✓ sticky, wet, corrosive or liquid particles that are not easily removed in dry conditions;
- ✓ explosive or combustible characteristics;
- ✓ simultaneous control of soluble gases (SO_2).

A "water-wash wall" is often found in paint application booths at the back to collect paint overspray.

Wet scrubbers will have higher capital and maintenance costs than cyclones. One maintenance cost will be disposal of the wastewater created by the method of control.

Fabric Filters

Devices such as a baghouse or a wall of flat filters are most often used for their high collection efficiency but a middle range for capital and maintenance costs. High-tech baghouses available for collecting particles from gases containing acids or caustics will involve higher costs.

Baghouses can be used by a wide range of industries. A filter wall is often found in paint application booths and fiberglass reinforced plastics molding booths to collect the overspray.

Electrostatic Precipitators

The electrostatic precipitator (ESP) uses electrical forces to move particles from the gas stream to collector plates. The particles are collected from the plates either by knocking them loose or by washing the plates with intermittant or continuous streams of water. These units have very high collection efficiencies but will have higher capital and maintenance costs. They are most often found at utilities that use coal boilers to generate steam.

Assistance

With such a variety of particulate matter control device options available, you may need to hire a consultant to help you determine which is the most efficient and cost effective for you. *The SBCAAP has fact sheets to help: such as a list of consultants serving small businesses in Wisconsin and some key questions to ask when hiring a consultant.*

Contacts for More Information or Assistance.

The Small Business Clean Air Assistance Program helps smaller businesses understand and comply with the Clean Air Act regulations. Contact one of the program's Clean Air Specialists for more assistance: Renée Lesjak Bashel at 608/264-6153 or Tom Coogan at 608/267-9214.

For further information on particulate matter emissions contact your DNR Regional or Service Center office shown on the **DNR Contact Fact Sheet**.